THE AMERICAN
JOURNAL OF PHARMACY

SEPTEMBER, 1893.

ON THE COMPOSITION OF AMERICAN PENNYROYAL OIL.[1]

By Chas. J. Habhegger.

In a paper read before the American Pharmaceutical Association in 1887, Dr. Edward Kremers showed that the American pennyroyal oil, after saponification with caustic potash, yielded two fractions of like empirical composition, $C_{10}H_{18}O$. In 1891,[2] he showed that these two fractions although of widely differing boiling points 168–171° C. and 206–209° C. respectively, were both ketones yielding similar oximes one of which was probably menthoxime.

In the year following,[3] further experiments were made in the same direction without, however, coming to as satisfactory a conclusion as might have been desired. The work was to have been continued during the past year, but it was impossible to obtain a reliable specimen of American pennyroyal oil in sufficient quantity.

As Mr. Witte[4] states in his thesis, experiment had already indicated that the American pennyroyal oil contained pulegone, and that the two substances, $C_{10}H_{18}O$ are reduction products of the same. Beckmann and Pleissner[5] state, it is true, that they have not succeeded in obtaining crystalline pulegoneoxime from American or Algerian pennyroyal oil. To ascertain, definitely, whether the

[1] Read at the meeting of the Wis. Pharm. Assoc., Fond du Lac, August, 1893.

[2] Phar. Rundschau, Band IX, p. 130.

[3] Proc. Wis. Pharm. Assoc., 1892, p. 55.

[4] Ibidem, 1892, p. 55 and 59.

[5] Ann. d. Chem., Bd. 262, p. 37.

American oil contains pulegone or not, the following study was undertaken.

PULEGONEOXIME.

The difficulties in preparing the oxime, from the American oil, were overcome by proceeding in the following manner: To 20 parts of the oil, 12 parts of hydroxylamine hydrochlorate, with 14 parts of sodium bicarbonate, and a mixture of 30 parts of ether and 10 parts of alcohol are added. The mixture was allowed to stand overnight, and then heated for two hours on a water-bath, and filtered while hot. Almost immediately crystals of the oxime appeared.

A number of modifications of this process had previously been tried, only one of which was successful, besides the above mentioned. The modification in this case consisted in heating the mixture for one hour, before allowing it to stand overnight. The crystals of oxime obtained melted at 137–138° C. The melting point was raised to 147° C. by recrystallization, from a mixture of three parts of ether and one part of alcohol.

Dried over calcium chloride this oxime, corresponding in appearance to pulegoneoxime of Beckmann and Pleissner,[1] yielded upon analysis the following results:

(I) 0·2946 grams of the substance yielded, 0·6980, CO_2 = 0·1903 C
and 0·2856, H_2O = 0·0317 H

(II) 0·2184 grams of the substance yielded, 0·5196, CO_2 = 0·1417 C
and 0·2044, H_2O = 0·0227 H

(III) 0·1878 grams of the substance yielded, 0·4438, CO_2 = 0·1210 C
and 0·1818, H_2O = 0·0202 H

(IV) 0·1382 grams of the substance yielded 10·2 cc. of nitrogen under a barom. pressure of 728 mm., and at a temperature of 21° C. = 0·0111 grams nitrogen.

(V) 0·1964 grams of the substance yielded 15 cc. of nitrogen under a barom. pressure of 743 mm., and at a temperature of 19° C. = 0·0168 grams nitrogen.

	Calculated for $C_{10}H_{16}NOH,H_2O$.	Obtained.				
		I.	II.	III.	IV.	V.
C, ...	64·86	64·59	64·88	64·43	—	—
H, ...	10·27	10·76	10·39	10·75	—	—
N, ...	7·57	—	—	—	8·03	8·57
O, ...	17·30	—	—	—	—	—

From the above results, it will be seen, that no doubt can exist,

[1] Ann. d. Chem., Bd. 262, p. 6.

as to the identity of this compound with the pulegoneoxime obtained by Beckmann and Pleissner,[1] from the oil of Mentha Pulegium, the Spanish Pennyroyal oil. Its action toward polarized light also agrees very well with that of the pulegoneoxime of Beckmann and Pleissner.[2]

S 1·2390 grams
L (ether) 35·5144 grams
p. 3·48 p. c
t. 20° C
d. 0·751
l. 1 d.m.
α — 2·33°

$[\alpha]_D = -88·77$

Beckmann and Pleissner found $[\alpha]_D = -83·44$.

THE BENZOYLESTER OF PULEGONEOXIME.

Beckmann and Pleissner[3] prepared a benzoylester by adding to two parts of the pulegoneoxime a solution of two parts of benzoylchloride in ten parts of ether. After the ether has evaporated, the residue is treated with sodium hydroxide in the cold, when the ester will congeal to a white plastic mass. This can be crystallized from dilute alcohol, or from a mixture of benzene, and that fraction of petroleum benzine boiling at about 50° C. The benzoylester of Beckmann and Pleissner[4] is stated to have been obtained, in colorless needle-shaped crystals, melting at 137–138° C., with the generation of gas.

The benzoylester obtained from one gram of the oxime crystallized only in part in needle-shaped crystals, which were only partially soluble, in the mixture of benzene and petroleum benzin, or alcohol, or ether. The melting points ranged from 137° C. upward. The crystals obtained from the mixture of benzene and petroleum benzin melted at 141° C. Those insoluble in this mixture, even after heating for several hours on a water-bath, melted at 175° C. This discrepancy of the benzoylester can be explained, by

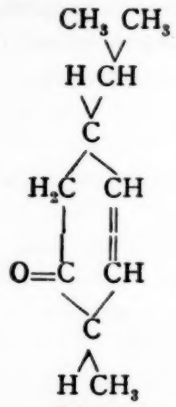
[1] Ann. d. Chem., Bd. 262, p. 7.

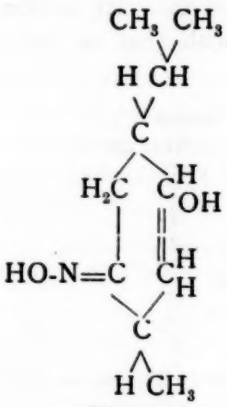
[2] Ibidem, p. 8.

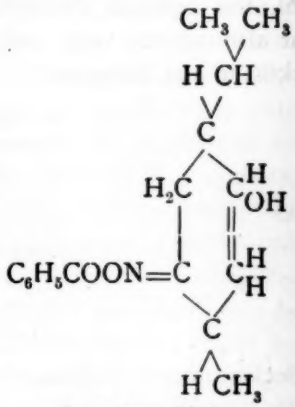
[3] Ibidem, p. 10.

[4] Ibidem, p. 10.

assuming that the benzoyl radical replaces the hydrogen of the other hydroxyl group, besides that of the oxyimido group.


Pulegone.


Pulegoneoxime.


Benzoylester of Pulegoneoxime.

A cabinet specimen of American pennyroyal oil, which had been standing for ten years, also yielded pulegoneoxime though not as readily.

The oil used in these experiments had been kindly furnished by Messrs. Fritzsche Bros. of New York.

PHARM. LABORATORY, UNIV. OF WISCONSIN, MADISON.

OIL OF ERIGERON CANADENSE (Linné).[1]

BY FRITZ W. MEISSNER.

The first investigations of this oil, in regard to its general properties, as well as its boiling point and specific gravity, were made by Procter[2] in 1884. In 1881, Vigier and Cloez[3] made a more careful examination of the oil and determined its specific gravity to be 0·848 at 10° C. and that it boiled between 175–176° C.

They were also the first to ascertain its composition, which they found to be $C_{10}H_{16}$. In its action toward polarized light, they found the angle of polarization to be + 16·15°. With hydrogen chloride they obtained a dihydrochloride of the composition $C_{10}H_{16}2HCl$.

---

[1] Read at the meeting of the Wis. Pharm. Assoc., in Fond du Lac, August 1893.

[2] Am. Journ. Pharm., Vol. XXVI, p. 502.

[3] Am. Journ. Pharm., 1881, p. 12, and Journ. de Pharm., IV, p. 236.

Similar results were obtained in 1882 by Beilstein and Wiegand.[1] They found the specific gravity to be 0·8464 at 18° C. and that after drying the oil with metallic sodium it boiled at 176° C. In 1884, Wallach[2] obtained a tetrabromide, a limonene tetrabromide, which melted at from 104–105° C. In 1887, A. M. Todd[3] made several investigations and found the angle of polarization to be —26° to —60°, its specific gravity 0·865–0·855, and its boiling point at 172–175° C. In the same year G. M. Beringer[4] found the specific gravity to be 0·8454 at 15·5° C. In 1887, Flückiger,[5] in a communication from a letter by Todd, states that by the addition of bromine to a cold solution of the oil in glacial acetic acid, he obtained a crystallized compound, limonene tetrabromide, $C_{10}H_{16}Br_4$. In September of 1887, Prof. F. B. Power[6] found, in investigations which he made, that the boiling point was at 176° C., the specific gravity 0·8498 at 15° C. and its composition to be $C_{10}H_{16}$.

These results are of special value, as well as those of Flückiger, since the specimens of oil examined were distilled for their purpose by Todd. As to the question, which terpene it is, that constitutes by far the largest fraction of oil of Erigeron Canadense, the facts rendered by the contributions catalogued would lead to the conclusion that it was one of the limonenes.

The boiling points given by Vigier and Cloez (175–176° C.) by Beilstein and Wiegand (176°) and by Prof. F. B. Power (176° C.) correspond well with the boiling point of pure limonene (175–176°). The dihydrochloride, which Vigier and Cloez obtained, is no absolute proof for limonene, though both limonenes will yield this compound under certain conditions. This dihydrochloride can also be obtained from pinene, from terpineol, from terpin-hydrate, and the other bodies occurring in volatile oils.

The tetrabromides obtained by Wallach, and later by Flückiger, are evidently limonene tetrabromide, as shown by their melting

[1] Berichte d. Deut. Chem. Ges., 1882, p. 2854, and Am. Journ. Pharm., 1883, p. 372.

[2] Annalen, 227, p. 292.

[3] Am. Journ. Pharm., 1887, p. 302.

[4] Ibidem, p. 285.

[5] American Druggist, 1887, p. 201.

[6] Pharmaceutische Rundschau, 1887, p. 201.

point. Since neither Wallach nor Flückiger paid any attention to the optical activity of the oil, and since literature shows contradicting statements, a final settlement of the identification of the terpene was desirable.

To remove all doubts as to the nature of this terpene, Prof. F. B. Power, in 1890, put at the disposal of Dr. E. Kremers the fraction of 176°, which he had retained from his investigations of 1887. The nitroso chloride reaction, according to Wallach, was made, and limonene nitroso chloride was obtained in sufficient quantity from 5 cc. of the oil. The nitroso chloride was converted into the benzylamine base, which after washing with alcohol and drying, melted at 89–91° C. After one recrystallization the melting point rose to 93° C.

The action of the terpene upon polarized light was determined by a Soleil Ventzhe, of Schmidt and Haeutsch, of which 1 = 0·3455 circular degree. Thus 43·7 (the number of degrees shown by the instrument) 0·3455 = 15·098.

S 3·84 grams.
L (alc. and chl.) 18·19 grams.
p. = 17·43 per cent.
d. = 0·985.
t. = ?
α = + 15·098°
l = 1 d.m.

$(\alpha)_D$ = + 87·90

These results leave no doubt as to the nature of the terpene in question. It is dextrogyrate limonene.

The large quantities of resin, which have been repeatedly observed by Todd and others, e.g., in this laboratory, indicate that there is some other substance besides limonene in the oil. What this substance is, still remains to be ascertained. In order to determine, if possible, something more about the composition of Erigeron oil, the following investigation was undertaken.

Experimental Part.—The oil at my disposal was obtained from Fritzsche Bros., New York. It was the larger portion of that fraction of two kilograms of oil, which distilled below 180° C. Besides this, which was by far the largest fraction, about 200 cc. distilled at 180–185°, 100 cc. from 185–190°, and only a few cubic centimetres in fractions of five degrees each from 190° to 220°. The

residue above 220° was viscid and resinous. The fraction boiling below 180°, of which there were 1053·0 gm. of the specific gravity 0·853 at 15° C., was distilled with water vapors, to free it from the resin, which remained in the flask as a viscid cherry red liquid. The oil was separated from the water and dried at the temperature of the water-bath with caustic potash. The dry oil was then repeatedly subjected to fractional distillation with the aid of a column. The following table gives the fractions obtained, their specific gravity, and action upon polarized light:

	Fract. B. P.	Sp. G. at 20° C.	a for 100 mm.	$(a)_D$.	Aprox. Amt.
I, ...	170°	0·8521	+ 79·2°	+ 92·9°	50 cc.
II, ...	170–172°	0·8503	+ 82·77°	+ 97·3°	120 cc.
III, ...	172–174°	0·8510	+ 85·79°	+ 100·8°*	250 cc.
IV, ...	174–175°	0·8460	+ 90·64°	+ 107·1°	250 cc.
V, ...	175–176°	0.8476	+ 92·77°	+ 109·4°*	200 cc.
VI, ...	176–178°	0·8450	+ 95·94°	+ 112·35°	75 cc.
VII, ...	178–180°	0·8485	+ 93·34°	+ 110·7°	50 cc.

* Of fractions III and V the rotatory power of solutions was also ascertained.

Fraction III.	Fraction V.
S = 2·9684	S = 2·199
L (alc.) = 58·4220	L (alc.) = 46·6506
p. = 4·83 per cent.	p. = 4·5 per cent.
d. = 0·816	d. = 0·816
t. = 20	t. = 20
l = 1 d.m.	l = 1 d.m.
a = + 3·71	a = + 3·81
$(a)_D$ = + 94·1	$(a)_D$ = + 103·75

It will be seen from this table that, with the increase of the boiling point of the fractions up to the sixth, there is on the whole a diminution of the specific gravity, but an increase of the rotatory power. With fraction VII, the increase in temperature is accompanied by an increase of specific gravity, but there is a diminution of the rotatory power.

Fraction I (170°).—This fraction was obtained chiefly between 168–170° C. Its high specific gravity led to the suspicion that

pinene might be present. (The specific gravity of pinene being 0·856–0·863 at 20° C. and boiling at 160°.)

First of all, it was desirable to ascertain whether this fraction consisted entirely of hydrocarbons or not.

Upon combustion the following results were obtained:

(I) 0·1570 g. of substance gave 0·1686 gm. of H_2O = 0·0187 gm. of H
and 0·4970 gm. of CO_2 = 0·1315 gm. of C

(II) 0·1226 g. of substance gave 0·1290 gm. of H_2O = 0·145 gm. of H
and 0·3856 gm. of CO_2 = 0·1051 gm. of C

	Calculated for		Found.	
	$C_{10}H_{16}$	$C_{10}H_{18}$	I.	II.
C, . .	88·23 p.c.	86·95 p.c.	85·98 p.c.	85·72 p.c.
H, .	11·76 p.c.	13·04 p.c.	11·91 p.c.	11·82 p.c.

It is evident from these results, that this fraction does not consist exclusively of hydrocarbons. To ascertain whether any esters were present, a small quantity (2·2472 gm. of the fraction) was heated with a standard alcoholic potash solution (5 per cent.) for one hour on a water-bath. But upon titration it was found that none of the potash had been consumed. Thus there is evidently a small quantity of some substance present which escapes identification thus far.

A nitroso chloride was prepared from 10 cc. of this fraction, according to Wallach's method, with a yield of 6·970 gm. The larger portion of this was soluble in ether. The crystals from the ethereal solution were recognized as α-nitroso chloride, with some dipentene nitroso chloride, which crystallized from the mother liquid of the α-limonene nitroso chloride. The portion insoluble in ether proved to be limonene β-nitroso chloride as was shown by its solution in chloroform and precipitation as acicular crystals, on the addition of methyl alcohol. The tabular crystals of the α-nitroso chloride, when dried melted at from 94–95·5° C. Those of the limonene β-nitroso chloride when dried melted at 104° C.

In rotatory power the α-nitroso chloride compared favorably with the results of Wallach and Conradi,[1] as shown by the following data:

S = 2·00
L (ether) = 38·0
p. = 5 per cent.
d. = 0·750
t. = 20°
I = + 11·60

$(\alpha)_D$ = + 309·3

[1] Annalen, p. 252.

The limonene *a*-nitroso chloride was converted into a benzylamine base, which when dried melts from 92–93° C. (Melting point for limonene *a*-nitrolamine as observed by Wallach[1] is the same, i.e., 92–93° C.)

Fraction II (*170–172°*).—Of this fraction a nitroso chloride was also prepared and purified as described above. The melting point of the tabular crystals, from the ethereal solution, when dried, was from 99–102° C. A benzylamine base was made of the limonene nitroso chloride, which when dried, melted from 91–92·5° C.

Fraction III (*172–174°*).—The limonene *a*-nitroso chloride prepared from this, when purified and dried, melted at from 99–103° C. The benzylamine base of this when dried, melted at from 91–92·5° C.

Fraction IV (*174–175°*).—Although there can be but little doubt as to the largest per cent. of this fraction being limonene, traces of foreign bodies have covered the odor of this hydrocarbon. In order to bring out the limonene odor, these foreign bodies were removed by treating a portion of the fraction with permanganate of potash solution. To 200 cc. of a half per cent. of permanganate of potash solution, 10 cc. of oil were added. This after standing for twelve hours discolored the solution. The oil was separated and added to fresh solution of permanganate of potash. This, upon standing in the cold for twenty-four hours, did not change color. The original odor, however, of the oil had been changed to that of pure limonene.

Fraction V (*175–176°*).—Of this fraction a nitroso chloride was also prepared, which when pure melted from 99–103° C. The benzylamine base, into which the limonene nitroso chloride converted, when dried, melted at 90–92° C.

These results verify the statement that Erigeron oil consists chiefly of dextrogyrated limonene. Even these fractions, which possessed a somewhat higher or lower boiling point—evidently consist almost entirely of this hydrocarbon, the boiling point of which is slightly depressed or raised by other substances. The thought that pinene possibly occurred together with limonene in the oil evidently must be dismissed. The principal constituent of the oil besides limonene appears to be a high boiling substance, probably aldehyde-like in

[1] Annalen, p. 136.

character, since it so readily decomposed, and polymerizes. In order to isolate this substance, other methods than fractional distillation under ordinary pressure must be resorted to.

PHARM. LABORATORY, UNIV. OF WISCONSIN, MADISON.

JUGLANS CINEREA, L.

BY ELLIOT D. TRUMAN, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 127.

This tree is indigenous to northeastern United States and Canada. It perhaps grows nowhere more luxuriantly than in central New York State. Its abundance in that section has occasioned the naming of a sub-tributary, of the Susquehanna, the "Butternut Creek."

The wood of this tree is used to some extent in the manufacture of furniture, it being easily worked, very durable, and susceptible of a fine polish.

The fruit is employed as an article of food, both in the unripe state, when it is pickled, and as the ripened fruit in the well-known butternut.

The bark furnishes us a remedial agent of undoubted value, which is, or has been, largely employed in stomach and bowel derangements, in this country perhaps more largely during the 18th and first part of the 19th century than at the present time.

This bark was examined in 1872, by C. O. Thiebaud, who found it to contain bitter extractive oily matter in large proportion, and a volatile acid, juglandic acid, crystallizing in colorless tabular crystals. The ash was found to consist largely of potassium, with traces of sodium, calcium and aluminum.

Again in 1874, the bark was investigated by E. S. Dawson. He found it to contain resin, in small proportion, a volatile acid, and the ash to consist of magnesium in addition to the bases above-mentioned. These bases were found in combination with carbonic, hydrochloric, phosphoric and silicic acids.

The present examination of this bark, having been carried out in a somewhat different manner from those of Thiebaud and Dawson, the results are given for convenience in a tabulated form. There were two analyses made, the treatment of the drug being identical in each case.

In the first analysis, a quantity of the root bark, crop of 1892, was obtained from a reliable commercial source, and the work carried out in November and December of that year. In the second analysis, the bark from the branches of the tree was employed. This bark was collected for the author early in January of this year, in Otsego County, New York State. A tree about twenty years old was selected, and the bark taken from branches 4 to 5 inches in diameter, without removing the corky portion

Solvent Used.	Root Bark.	Per Cent.	Trunk Bark.	Per Cent.
Petroleum ether,	Fixed oil,	4·94	Fixed oil,	5·98
Stronger ether,	Fixed oil and colorless crystalline resin,	2·31	Fixed oil and colorless crystalline resin,	2·59
Absolute alcohol,	Juglandic acid, extractive matter, etc.,	6·94	Uncrystallizable acid, crystalline resin, etc.,	7·42
Distilled water,	Dextrin,	0·52	Dextrin,	0·70
	Mucilage,	2·25	Mucilage,	0·70
	Glucose,	3·05	Glucose,	3·34
	Saccharose,	1·34	Saccharose,	2·06
	Extractive,	2·49	Extractive,	4·20
Dilute solution of sodium hydrate,	Pectin and albuminous matter,	1·68	Pectin and albuminous matter,	1·48
	Coloring matter and extractive,	6·86	Coloring matter and extractive,	2·06
Dilute hydrochloric acid,	Pararabin and traces of calcium oxalate,	2·62	Pararabin and calcium oxalate,	4·08
Chlorine water,	Lignin,	9·22		6·96
	Cellulose,	44·26		43·79
	Moisture,	4·60		4·75
	Ash,	5·82		5·34
	Loss,	1·10		4·55
		100·00		100·00

The fixed oil in each case was brown in color, and saponifiable by alkalies, the latter turned them of a violet color, this color was much brighter with the oil from the bark of the root.

Of the extractions with ether, when that from the bark of the root was treated with water the latter was colored a bright straw-yellow, it was neutral to litmus and gave a bluish-brown color with solution of ferric chloride. This water solution was tested for glucose and glucosides, but no reactions observed. The remainder of the ethereal extract consisted in part of a brown fixed oil, identical in appearance and reactions with that extracted by petroleum ether,

and in part of a nearly colorless crystalline resin. This resin gave no characteristic color reactions with the mineral acids. The ethereal extract from the bark of the tree did not impart a straw color to water, and gave no reactions with glucosidal reagents. The residue in this case, as in the other, consisted of oil and crystalline resin.

The alcoholic extracts of the drugs yielded a red-wine color to water, which color was in part removed by agitation with ether, and on evaporation of the latter solvent there were deposited orange crystals, which became of a deep violet with alkalies. They represented the juglandic acid of former investigators, and were so readily decomposed that mere solution in ether caused their decomposition with the formation of resinous products, insoluble in water. The portion of the alcoholic extract insoluble in water consisted of this insoluble residue. A qualitative analysis of the ash confirmed, in most part, Dawson's report, the aluminum was not found, and no doubt the former investigators were misled by the calcium phosphate.

BENZYLIDINE DIPIPERIDINE.[1]

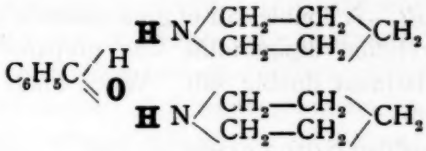
By George W. Ascott.

During the year of 1891–92, Chas. F. Tompkins made a study of benzylidine dipiperidine and several of its derivatives. He showed that this compound could be readily obtained by the condensation of one molecule of benzaldehyde and two molecules of piperidine. The readiness with which this reaction takes place is quite remarkable and would appear to be rather incompatible with the decomposition of this compound into its components. Of the derivatives of benzylidine dipiperidine studied, two are of special interest. One of these was prepared by Mr. Tompkins, by passing hydrogen sulphide into benzylidine dipiperidine in alcoholic solution, when it separates as a grayish white amorphous powder, which can be converted into a crystalline compound with comparative ease. The other one, a crystalline compound, was obtained from the mother liquor of the first. Both of these compounds invite further investigation.

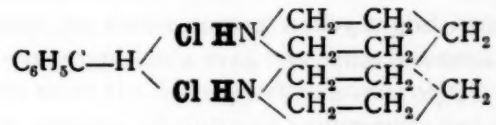
---

[1] Read before the meeting of the Wis. Pharm. Assoc., Fond du Lac, August, 1893.

Benzylidine Dipiperidine.—No difficulty was experienced in preparing this compound according to the method given last year in the "Proceedings of the Wisconsin Pharmaceutical Association" of 1892, p. 84. Since the synthesis of this compound was so readily effected with benzaldehyde according to the following reaction:



It seemed desirable to effect the same with benzalchloride in the following manner:



5·3 grams of piperidine are added to a solution of 5 grams of benzalchloride in 10 grams of petroleum-ether. The solution is heated on a water-bath in a flask connected with an inverted condenser for 15 minutes. The solution is then filtered and set aside in a crystallizing dish. The yield of the crystallized product is very small, and is evidently the hydrochlorate of benzylidine dipiperidine as is shown by its analysis.

0·1700 grams yielded 0·1523 grams AgCl = 0·03753 grams Cl.

Calculated for $C_{17}H_{26}N_2.2HCl$	Found.
21·40 p. c.	22·07

Benzylidine dipiperidine hydrochlorate crystallizes in long shining needles, having a melting point of 250° C. It is soluble in alcohol, chloroform and ether, from which it may be recrystallized. Owing to the readiness with which benzylidine dipiperidine decomposes under the action of alkalies, no attempt was made to prepare the free base from this salt.

Platinum Double Salt.—On p. 85, "Proceedings of the Wisconsin Pharmaceutical Association," of 1892, it will be seen that the platinum calculated for in the formula $C_6H_5CH\cdot(NC_5H_{10}HCl)_2PtCl_4$ is given as 67·20 per cent., while that obtained was 67·55 per cent. This evidently is a mistake, as a compound of the above formula

should contain but 38·72 per cent. An estimation of the platinum in the salt prepared by Mr. Tompkins gave the following results:

0·0954 grams yielded 0·0362 grams of platinum.

Calculated for $C_{17}H_{28}N_2Cl_{10}Pt_2$	Found.
38·72 p. c.	37·94 p. c.

Gold Double Salt.—A double salt of gold chloride and the hydrochlorate of benzylidine dipiperidine was prepared in a similar manner to the platinum double salt. When analyzed it yielded the following results:

0·1520 grams yielded 0·0592 grams of gold.

Calculated for $C_{17}H_{28}Cl_2N_2AuCl_3$	Found.
40·40 p. c.	38·94 p. c.

This salt forms bright yellow prisms, which are freely soluble in alcohol, chloroform and ether, and have a melting point of 183–185°.

Benzylidine Dipiperidine and Picric Acid.—If to an alcoholic solution of benzylidine dipiperidine an alcoholic solution of picric acid be added in molecular proportions, and the combined solutions filtered and set aside to crystallize, handsome yellow crystals will separate out. This compound when recrystallized from alcohol and analyzed yielded the following results:

I. 0·1543 grams yielded 12 cc. of nitrogen under a barometric pressure of 739 mm., and at a temperature of 23° C. = 0·011234976 N.

II. 0·2010 grams yielded under a barometric pressure of 720·4 mm. and at a temperature of 22° C. 14 cc. of N = 0·01505588 N.

Calculated for $C_{17}H_{26}N_2C_6H_2(NO_2)_3OH$	$C_{23}H_{27}N_5O_8$	Found. I.	Found. II.
14·30 p. c.	11·13	7·28	7·01

This compound has a melting point of 146° C. It is soluble in alcohol, chloroform and ether, from which it may be recrystallized. When heated in the flame of a Bunsen burner it decomposes with a slight explosion, leaving a black residue. A satisfactory formula has not yet been calculated.

Amorphous Sulphur Compound.—This compound was very readily prepared according to the method given on p. 85 of the "Proceedings of the Wisconsin Pharmaceutical Association for 1892." Hydrogen sulphide is passed into a cold alcoholic solution of benzylidine dipiperidine when the amorphous compound will separate out, and the liquid assumes a deep red color, having a strong odor of hydrogen

sulphide. The average yield of the compound was 35–38 per cent., while in the experiments conducted by Mr. Tompkins, about 40 per cent. was obtained. This amorphous compound is insoluble in alcohol, but is readily soluble in ether, chloroform and disulphide of carbon.

It melts at a temperature of 150–155° C. and when heated in small quantities in test tubes, at a very gentle heat, fuses to a dark amber colored liquid, which upon cooling solidifies without crystallization. If, however, it be heated to a higher temperature, upon cooling it deposits crystals, part of which are soluble in alcohol and the remainder in ether. After removing the crystals soluble in alcohol and allowing to recrystallize, the substance will at first separate out as an amorphous powder, which, however, after being repeatedly crystallized from chloroform and alcohol may be obtained as handsome needle-shaped crystals or as very fine crystalline scales of a brownish yellow color. That portion of the crystallized product insoluble in alcohol, but soluble in ether, was then removed from the amorphous residue, and after being repeatedly crystallized was obtained in a fairly pure condition, when they were found to be readily soluble in alcohol, from which they recrystallize in handsome needles. These crystals have the same melting point and the same properties as the alcoholic crystals. They melt at 120° C. and when analyzed yielded the following results:

I. 0·200 grams yielded . . . . . 0·6557g CO_2 = 0·1788 grams C
" " " . . . . . 0·1220g H_2O = 0·01355 " H
II. 0·1664 grams yielded . . . . . 0·5232g CO_2 = 0·1426 " C
" " " . . . . . 0·1006g H_2O = 0·01112 " H
III. 0·1280 grams yielded . . . . . 0·4179g CO_2 = 0·11397 " C
" " " . . . . . 0·0836g H_2O = 0·00928 " H

IV. 0·1379 grams yielded under a barometric pressure of 721 mm. and at a temperature of 21° C. 9·8 cc. of nitrogen = 0·01062768 grams N.

Calculated for $C_{17}H_{30}N_2$	Found.			
Per Cent.	I.	II.	III.	IV.
C, ... 77·8	89·04	85·69	89·03	—
H, ... 11·4	6·70	6·68	7·25	—
N, ... 10·6	—	—	—	7·63

It is remarkable that this compound is totally free from sulphur, which remains behind with the amorphous residue. Upon long standing this amorphous compound undergoes the same decomposition as when heated.

Crystalline Sulphur Compound.—After removal of the amorphous sulphur compound from the alcoholic solution of benzylidine dipiperidine the mother liquor was set aside in a cool place.

After standing for several weeks crystals began to form, at first very slowly, but later on quite rapidly, continuing until the entire liquid had evaporated. This would seem to indicate that by the action of hydrogen sulphide on benzylidine dipiperidine, in alcoholic solution, two compounds at least are formed.

The sulphur in this crystalline compound estimated as barium sulphate gave the following results:

I. 0·1556 grams yielded 0·3144 grams $BaSO_4$ = 0·0431 S
II. 0·1948 " " 0·40894 " $BaSO_4$ = 0·05616 S

Calculated for $C_{17}H_{30}N_2S_2$	Found.	
	I.	II.
26·81 p. c.	27·12	28·02

The result of this sulphur estimation agrees fairly well with the results obtained by Mr. Tompkins.

This compound, when thoroughly purified by recrystallization, yields crystals of a grayish white color having a melting point of 75–76° C. They are soluble in alcohol, from which they recrystallize readily. This compound is permanent in the air and when boiled with water separates oily drops which float. It fuses at a gentle heat and upon cooling crystallizes without apparent change.

Benzylidine Aniline.—Since, by the action of hydrogen sulphide on benzylidine dipiperidine, two very interesting compounds were obtained, it was thought well to ascertain if similar results could be obtained with other condensation products of benzaldehyde. To this end benzylidine aniline was prepared in the following manner: 4·3 grams of aniline was added to a solution of 5 grams of benzaldehyde in 10 grams of petroleum-ether. The mixture is heated on a water-bath in a flask connected with an inverted condenser for fifteen minutes. The solution is then filtered and set aside to crystallize. It crystallizes very readily, a large yield being obtained. From fifteen grams of benzaldehyde 10·34 grams of benzylidine aniline were obtained or 68·92 per cent. This was dissolved in alcohol and a current of hydrogen sulphide led into the solution when a grayish amorphous compound separated out similar to that obtained from benzylidine dipiperidine. From 10·34 grams of benzylidine aniline, 7·08 grams of the amorphous compound were obtained or 68·4 per cent. This

compound when heated in small quantities in test tubes fuses to a greenish liquid, which rapidly turns to a dark amber. Upon cooling it deposits crystals. These crystals are partly soluble in alcohol and the remainder in ether. An amorphous residue remains, which contains sulphur. The crystals, when purified, are all found to be soluble in alcohol, from which they crystallize in very fine crystalline scales. They have a melting point of 120° C., and to all outward appearances are identical with those obtained from benzylidine dipiperidine.

PHARMACEUTICAL LABORATORY, UNIV. OF WISCONSIN, MADISON.

AN IMPROVED SHAPE FOR SUPPOSITORIES AND BOUGIES.

BY HENRY S. WELLCOME.

[Read before the American Pharmaceutical Association, Chicago, 1893.]

The use of suppositories as vehicles for medication and alimentation has undoubtedly greatly increased during the past few years, but it is a very remarkable fact that since their first introduction into pharmacy there has been scarcely any improvement in shape.

The ordinary cone-shaped suppository which has so long done duty is easily inserted, but often more easily expelled, and this great defect has caused the most aggravating annoyance and disappointment to both physician and patient.

When a suppository of the ordinary shape is introduced into the anus or fundament, the lower extremity of the great intestine, the pressure of the muscles which are peculiar to the *sphincter ani* act entirely with expelling force, unless the suppository is introduced a considerable distance into the rectum. Even then, the *levatores ani*, which serve to dilate and draw the anus up to its natural situation after the expulsion of the fæces, fail to grasp the suppository when introduced small end first on account of its unreasonable shape; in fact, the old suppository has always been introduced wrong end first.

A double cone-shaped suppository has been devised, which is certainly an improvement over the ancient form, but this does not in all cases insure retention, as the double cone form only secures

about equal division of the retaining and expelling force of the *sphincter ani.*

I have designed a suppository which I believe fully overcomes the difficulty. It is practically the reverse of the old shape. This improved suppository is formed with a thick bulb abruptly pointed at the apex like a fat cigar or minnie bullet, and gradually tapered at the base.

A forty-five grain cacao butter rectal suppository of this shape is one and a half inches in length and half an inch in diameter at the thickest portion of the bulb, the thickest portion being half an

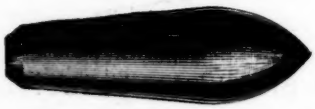


FIG. 1.—Rectal Suppository.

inch from the apex and one inch from base. The base is a quarter of an inch in diameter and is cut off transversely. The taper both to the apex and to the base has a somewhat bulbous curve, as shown in the accompanying drawing.

This improved suppository is inserted with the thick bulbous head foremost, and by the reflex contraction of the *sphincter ani* not only is expulsion prevented, but the suppository is naturally held in position. The entire muscular force acts to retain and press inward.

These suppositories of my design have been tested in one of the principal London hospitals with unqualified success. I apply this

FIG. 2.—Urethral Bougie.

same shape suitably modified for vaginal suppositories, also with suitable modifications for urethral bougies.

Any pharmacist who desires to please the medical profession, and greatly benefit those for whom he dispenses—to say nothing of his own profit from enterprise—may by a small outlay procure moulds for preparing suppositories of this shape from any mould maker—they are neither registered nor patented.

THE PREPARATION OF THE OAK TANNINS, WITH SPECIAL REFERENCE TO THE USE OF ACETONE AS A SOLVENT.[1]

By Henry Trimble and Josiah C. Peacock.

The usual method for preparing a tannin from a substance as rich as nutgalls, or containing from 60 to 70 per cent. of the astringent principle, is to extract with a mixture of alcohol and ether, or, what amounts to the same thing, official ether, sp. gr. 0·750. When, however, the material is an oak bark, containing from 4 to 15 per cent. of tannin, the choice of a proper solvent becomes a more difficult matter.

During the past year a number of experiments have been made on oak bark with a view of determining the most satisfactory solvent for the tannin. The following are especially worthy of consideration:

(1) Official ether sp. gr. 0·750, which is equivalent to a mixture of alcohol and ether.

(2) Acetic ether.

(3) Water.

(4) Acetone.

The greatest objections to ether are its expense and the slowness of its solvent action, which consume time as well as a large amount of menstruum.

Acetic ether is a much better solvent, and the expense is the chief difficulty in the way of its use.

Water is slow in its solvent action; this, however, is in part overcome by long maceration, and then slow percolation. The tannin must be separated from the resulting aqueous solution, either by agitation with acetic ether, or by precipitation with lead acetate. In the latter process it was found possible at a considerable sacrifice of oak bark to procure a quantity of light-colored tannin, by precipitating one-half of the aqueous percolate with lead acetate, collecting the precipitate, stirring it through the other half of the percolate, and then filtering. The filtrate was very light in color, and was either evaporated under reduced pressure and submitted to further purification to be described hereafter, or it was agitated with

[1] Read at the meeting of the American Pharmaceutical Association, Aug. 16.

acetic ether, and, after removal of the latter solvent, purified in the same manner.

Apart from the slowness of this process, the yield of tannin after purification was always small when water was used as a solvent.

Within the past few years acetone has appeared in commerce in a nearly pure form. Its solvent action has been suggested for several plant principles, but thus far little, if any, reference has been made to its use as a solvent for tannin, although there is good reason for believing that some manufacturers are using it for the extraction of nutgalls. It is cheaper than ether, but more expensive than alcohol. It is a better solvent of tannin than either of these, and extracts the tannin with less sugar and other carbohydrates, because of its poor solvent power over these. Its low boiling point, 56·5°, renders its recovery easy and rapid, without danger of decomposition to the tannin.

From a sample of powdered nutgalls, commercial ether extracted 59·77 per cent. of solids, while acetone extracted 62·24 per cent. of the same.

The following process, after some preliminary experiments, has been devised and thus far proven satisfactory.

The powdered oak bark was well moistened with acetone, packed in a glass percolator, and the menstruum poured on until it commenced to drop from the lower orifice, when the latter was closed with a cork and the bark allowed to macerate for forty-eight hours. Enough of the solvent was poured on before maceration commenced to keep a thin layer of it above the drug. A glass plate smeared with petrolatum was kept on top the percolator to prevent evaporation. At the expiration of the maceration period, the stopper was removed and the percolation continued rapidly until the number of litres of percolate amounted to one-half the number of kilograms of oak bark used. The latter was then usually found to have been exhausted. In some instances, a No. 20, in others a No. 40 powder was used. In every case the acetone rapidly penetrated the drug and accomplished complete exhaustion. The acetone was removed by distillation, the first portion on a water-bath, under ordinary conditions, but the last portions by the additional aid of reduced pressure. The residual product was a dark red or brown semi-solid extract. This was warmed with water until nearly all of it dissolved. After cooling, the whole was fil-

tered and the clear filtrate was diluted with water as long as precipitation took place. This dilution separated much of the anhydrides. The filtrate from these was of a clear red color and yielded no further precipitate on the addition of water. It was agitated successively with acetic ether. The acetic ether portions were mixed and the solvent recovered by distillation under reduced pressure, which yielded the tannin in a porous or "puffed up" condition. The product was then treated with cold water, and, after filtration, was again separated by agitation with acetic ether. This process was continually repeated until the tannin was readily and completely soluble in water. The tannin then possessed considerable odor of acetic ether, which was removed by solution in official ether, sp. gr. 0·750, and, after filtering clear, distilling off the solvent under reduced pressure. The product was then digested with absolute ether, which dissolved the small amounts of adhering resin and crystalline principles which occur along with it in the bark or result from decomposition when working it, and the tannin remained behind nearly pure, and readily and completely soluble in water.

This process was carried out on barks from the following species of oaks: *Quercus alba*, *Q. coccinea* and its variety *tinctoria*, *Q. falcata*, *Q. palustris*, *Q. Prinus*, *Q. bicolor*, *Q. stellata*, *Q. Phellos* and *Q. rubra*. It was found in some cases that by dissolving the acetone residue in a mixture of four parts water and one part alcohol, instead of water alone, that there was less formation of anhydrides.

A few trials were made with a modification of the purification process in which the first acetic ether residue was dissolved in water and filtered through a freshly prepared lead compound obtained by precipitating a portion of the aqueous solution of the bark with lead acetate.

In some instances, the resulting filtrate was nearly colorless, but the loss of tannin was such as not to warrant the adoption of the process for general use. It might, however, be applied in certain cases with satisfactory results. From the colorless filtrate the tannin should be removed by agitation with acetic ether, and the remainder of the general purification process then carried out.

Betaïne and Choline were obtained by E. Jahns from Levant wormseed. (Ber. d. D. Chem. Gesell., 1893, 1493.)

IS IT POSSIBLE TO PRODUCE FLUID EXTRACTS OF SUCH STRENGTH THAT THEY CAN BE DILUTED WITH PROPER MENSTRUA TO STANDARD TINCTURES?[1]

By Joseph W. England, Ph.G.
Chief Druggist of the Philadelphia Hospital.

Examination of this query shows that its affirmative answer hinges upon the possibility of making fluid extracts which, properly diluted, yield products *identical* in the proportion and kinds of proximate principles found in tinctures made by direct exhaustion of the drug.

Can such fluid extracts be made?

If they can be, there is no need of making drug-tinctures, or tinctures from drugs; all that is necessary is a line of fluid extracts, and proper dilution, as wanted. If they cannot be made, then the practice should be condemned. The issue is a plain one; and the necessity of an accurate determination of the question demands the serious consideration of every thoughtful pharmacist.

If such fluid extracts can be made, it is obvious that certain conditions must exist. These are:

(1) That the physical conditions under which the drug is exhausted, shall be the same in making the fluid extract as in making the drug-tincture.

(2) That the menstruum employed in making the fluid extract and the drug-tincture shall be identical.

(3) That in the making of the fluid extract the drug shall be exhausted of *all* the proximate principles present in the drug-tincture, and in as great a *relative* proportion.

(4) That the fluid extract shall not be altered in composition by heat, from concentration of percolate.

(5) That the fluid extract shall not precipitate proximate principles on storing, and have these removed before being used.

It is not a difficult matter to have the physical conditions of drug-exhaustion the same in making a fluid extract as in making a drug-tincture. If, however, there is a change or difference of menstruum, it is manifest there must be a change or difference in the proximate principles dissolved; but this will be referred to later.

---

[1] Read at the meeting of the Georgia Pharm. Assoc.

If fluid extracts are to serve the double purpose of being used for making tinctures and also for their own virtues, it is essential that they contain *all* the soluble, proximate principles found in drug-tinctures, and in as great relative proportions.

Wherever medicinal action obtains, the therapeutically-active principles of a vegetable drug are *soluble* principles, that is soluble in water or alcohol, or a mixture of the two. *All* the soluble proximate principles of a vegetable drug are not necessarily therapeutically active, but in the immature condition of the rational therapeutics of our times, as to the changes produced by drug-extractives in cellular contents in diseased conditions, who can say that a given extractive of a drug having medicinal activity is inert or without medicinal value? At present, clinical evidence decides, most largely, the therapeutical worth of a drug or its preparation.

The action of a drug or its representative is exerted upon the cellular contents of human tissue or tissues in which the drug acts, modifying one or all of three cellular activities, *i. e.*, (1) nutritive, (2) functional, and (3) reproductive. The functional activities of cells being the most obvious, they have been the most carefully noted by therapeutists, indeed the modern description of the therapeutical action of a drug is almost wholly limited to a description of the functional disturbances produced by it. When it comes to a description of the modifying influence of drugs or their representatives upon the nutritive and reproductive activities of cells in disease, modern therapy has little to say in comparison with the attention paid to functional changes. In therapeutical experiments, unless a change be obvious, it is too often assumed that there is no change, and yet the nutrition and reproduction of the cell may be notably affected and not be obvious. Further, the activities of nutrition and reproduction are vitally connected with the existence of the cell, and most probably influence its functions; nutrition, certainly, plays a most important part in affecting function.

In addition to the necessity of fluid extracts containing *all* the proximate principles of drugs found in drug-tinctures (*if* they are to be used for making tinctures), it follows, of course, that they should be present in as great a *relative* proportion, so that the extract-tincture and the drug-tincture be equally representative of the drug in the amount of proximate principles present.

No isolated proximate principles, such as alkaloids, glucosides,

etc., can represent the *total* therapeutical activities of a drug. They represent their individual, therapeutical actions *only*, and nothing more. The *total* activities of a drug can only be had from the drug itself, or a preparation of the drug representing *all* the therapeutically active proximate principles as they exist in the drug. Hence, for example, aconitine, hyoscyamine, digitalin, and quinine represent their individual activities only. They do not represent the *total* therapeutical activities of aconite root, hyoscyamus leaves, digitalis leaves, and cinchona bark, respectively, for these drugs possess *other* proximate principles which have a therapeutic worth over and above that of the principles mentioned. It does not follow, either, that tinctures and fluid extracts necessarily represent the *total* therapeutical activities of drugs. They represent only the therapeutically active principles soluble in the menstrua used to exhaust the drugs, due allowances being made, of course, for those precipitated and removed.

Whilst alkaloids, glucosides, etc., do not represent the total activities of drugs, their isolation, where decomposition-products are not formed as a result of assay, is, next to clinical experience, the only means we have of estimating the therapeutic worth of a drug-preparation; and it is of value when—and *only* when, the manufacturer of the preparation uses in its making, the *proper* quality of crude drug. If he uses an inferior drug, and raises the natural amount of alkaloid or glucoside to the proper standard by their extraneous addition, the preparation will *not* represent the special activities of the superior drug, but will represent those of the inferior drug plus those of the compound added.

This doctrine of the individuality of the drug as against the individuality of its so-called active principles, is no new doctrine. It has been repeatedly taught by Squibb and other authorities, but in their strong endeavors to secure greater uniformity in drug-preparations (a laudable ambition within certain limits), manufacturers have largely ignored its existence; claiming that the percentage of a so called active principle is, of necessity, an index of the total therapeutic value of the drug-preparation.

Apropos of this subject, Prof. Attfield gives, in a recent number of *The Pharmaceutical Journal and Transactions* (July 15, 1893) some very interesting data had from an examination of certain samples of ipecacuanha. After showing the results of his analysis, and stating

that while such an alkaloid, as say quinine or morphine, has, at least, fixed and definite properties, the so-called "emetine" has not yet been obtained in sufficiently fixed and definite condition to enable us to say that it is one single substance, emetine, and nothing else. He further states that the acids and alkalies used by analysts in the isolation of the emetine attack it and render its yield inconstant, and says:

"It is to be hoped that any future authoritatively enjoined 'standardization' of ipecacuanha founded on proportion of emetine will be *therapeutically*[1] satisfactory, but such a position is not yet attained. Indeed, *it would seem that ipecacuanha root from which all 'emetine' is removed still has pharmacological value.*[1] The latter may or may not run parallel with percentage of emetine; meanwhile, our only guide is 'emetine,' estimated with all attainable accuracy."

So, it is a serious question whether tinctures made by diluting fluid extracts, *even though the latter be assayed*, are as good from a therapeutic standpoint as those made from the crude drug. Under certain conditions, it would seem as though some might be, but are they? As before said, alkaloids, glucosides, etc., do not represent the *total* therapeutical activities of drugs, and even if the relative strength of so-called active principle be the same in the "extract-tincture" as in the "drug-tincture," it indicates but one thing—the strength of the preparation in alkaloid or glucoside. It cannot indicate the amount of the other proximate principles of the drug. As in the case cited above, these latter may or may not run parallel with the alkaloid or glucoside.

The extractive matter of a drug (apart from the so-called active principles) has in many cases positive therapeutical worth, otherwise alcoholic or dilute alcoholic solutions of so-called active principles should yield *all* the therapeutical results of drug-tinctures; and we know they do not. That tincture only, then, is official, which contains *all* the therapeutically active constituents of the drug—alkaloids, glucosides and other extractive matter included—soluble in the menstruum officially directed for the tincture.

In those cases where it is possible, in the making of a fluid extract, to exhaust a drug of all its soluble proximate principles without the

[1] Italicized by J. W. England.

deleterious use of heat, and without subsequent precipitation of proximate principles with their necessary removal by filtration, it would seem as though a tincture made by diluting such a fluid extract should exhibit the same proximate constituents of the drug, in the same proportions, as the tincture made from the same sample of crude drug. But, it is evident that this can be the case, under such conditions only, *when the menstruum used in the making of the fluid extract is the same as that used in the making of the drug-tincture.* A change in alcoholic strength of menstruum used, always results in a change of the proportions, and in the same cases, of the kinds of proximate principles dissolved.

As an example of the influence changes in menstrua exert, a practice of the last Pharmacopœia may be cited. In the making of fluid extracts, the 1870 issue directed that the last portions of the percolate should be evaporated to a certain volume, and mixed with the reserved portion. This resulted in precipitation of proximate principles, owing to the fact that through evaporation of the last portions of the percolate the more volatile alcohol was most largely removed, leaving a weakly alcoholic liquid to mix with a stronger alcoholic one: hence precipitation occurred. In 1880, this practice was changed, and the last portions of the percolate are now evaporated to extractive, thereby eliminating both alcohol and water, and this is dissolved in the reserved percolate.

As a rule the more strongly alcoholic a menstruum used, the more rapid the exhaustion and the less extractive matter dissolved, while the more aqueous a menstruum, the slower the exhaustion and the greater the amount of extractive brought into solution. Hence, it is clear, that a tincture prepared from a fluid extract made with a certain menstruum, must, of necessity, be a different preparation in the proportion and, in some cases, of its kind of proximate principles, from a tincture of a crude drug made with a different menstruum.

It is a significant fact, that a number of important official tinctures are directed to be made with menstrua different in alcoholic strength from those ordered for corresponding fluid extracts; and this difference makes it impossible, in such cases, to obtain, by diluting the fluid extracts, the *same* therapeutical representatives of the drug as exhibited in the drug-tinctures.

The following table of certain official tinctures, showing the

strengths of menstrua for the tinctures and corresponding fluid extracts is of interest:

Name of Drug.	Menstruum for Tincture.	Menstruum for Fluid Extract.
	(parts.)	(parts.)
Digitalis,	A 1, W 1.	A 3, W 1.
Belladonna,	A 1, W 1.	A.
Hyoscyamus,	A 1, W 1.	A 3, W 1.
Stramonium,	A 1, W 1.	A 3, W 1.
Rhubarb,	A 1, W 1.	A 3, W 1.
Hydrastis,	A 1, W 1.	A 3, W 1.
Serpentaria,	A 1, W 1.	A 3, W 1.
Cubeb,	A 1, W 1.	A.
Sanguinaria,	A 2, W 1.	A.
Squill,	A 1, W 1.	A.
Colchicum Seed,	A 1, W 1.	A 2, W 1.
Bitter Orange Peel,	A 1, W 1.	A 2, W 1.

A, Alcohol; W, Water.

From this table it will be seen that, in the cases mentioned, much more strongly alcoholic menstrua are used for fluid extracts, than are directed for corresponding tinctures; and this must result in a certain relative difference between the two preparations.

A good illustration of the changes attendant upon a difference of menstrua, may be found in digitalis infusion. It is now accepted that the most important proximate constituents of digitalis leaves are Schmiedeberg's digitalin, with digitoxin, digitonin and digitalein. These may be grouped into two classes according to solubility. First, those soluble in alcohol and insoluble or almost insoluble in water; second, those soluble in both alcohol and water. Digitoxin and digitalin belong to the first group, and digitonin and digitalein belong to the second group. It will be seen that the tincture and fluid extract contain, most largely, digitoxin and digitalin with some digitonin and digitalein, whilst the infusion

contains digitonin and digitalein with *no* digitoxin or digitalin. So, the making of infusion of digitalis from the tincture or fluid extract (as is sometimes done) should be condemned, as such a practice will not yield the same preparation, therapeutically, as that had by direct infusion of the leaf.

When we come to those drug-tinctures having the same menstrua as corresponding fluid extracts, we should naturally expect, if perfect exhaustion of the same sample of drug has been had in both cases, that the drug-tincture and the extract-tincture would be equally representative of the drug. Theoretically, this may be true, but, practically, it is a question as to whether it holds good as a rule. It may be the case in some few fluid extracts, but in others it certainly is not. Take valerian tincture for example: made by drug-exhaustion it is one thing, made by extract-dilution from a fluid extract of the same sample of drug, it is quite another thing.

But, it may be urged, what evidence is there that drug-tinctures are *therapeutically* superior to extract-tinctures? The best of evidence in such a matter is clinical evidence. As before remarked, it is clinical experience which is accepted nowadays, to prove the therapeutical worth of a drug or its preparation (rational therapeutics has failed, as yet, to be accepted by practitioners unless confirmed by clinical evidence), and clinical experience confirms the view which practical pharmacy teaches—that a tincture made directly from a drug is stronger and better than a diluted fluid extract; no! it teaches more—it teaches that a properly made tincture is *stronger relatively*, than a fluid extract made from the same drug, for the reason *that the maximum doses of fluid extracts are, in many cases, if not in all, relatively greater than those of tinctures!* In other words, it requires more of the drug, relatively, as represented in a fluid extract, to produce its therapeutical effect, than it does of the drug as represented in a drug-tincture.

The following tables of official tinctures are of interest. The doses of fluid extracts are those given by four of the leading manufacturers of this country, for their products. The products stated to be assayed, are so marked. In some cases, the maximum doses of these latter are less than those of the non-assayed products; in other cases they are more.

TABLE NO. 1.

NAME OF DRUG.	Percentage of Drug in U. S. P. Tincture. (by weight.)	Percentage of Drug in U. S. P. Fluid Extract (by volume.)	Increased Strength of Fluid Extract in Drug. (times.)	Dose of Tincture.	*Relative* Dose of Fluid Extract.	Dose of Fluid Extract of Manufact'r. A.†	Dose of Fluid Extract of Manufact'r. B.	Dose of Fluid Extract of Manufact'r. C.	Dose of Fluid Extract of Manufact'r. D.	Average of Manu'f'rs. Maximum. Doses.
Aconite Root, . .	40	100	2·5	1–3 Min. (2-6 drops.)	$\frac{2}{5}$–1$\frac{1}{5}$ Min.	⅓–2 Min.	½–1 Min.	1–2 Min.	1–3 Min.†	**2·0 Min.**
Belladonna Leaves,	15	100*	6·6	5–20 Min.	¾–3 "	1–4 "	3–5 "	1–4 "	2–5 " †	**4·5 "**
Cannabis Indica, .	20	100	5·0	5–30 "	1–6 "	2–8 "	2–5 "	2–5 "	1–3 " †	**5·25 "**
Cinchona, ...	20	100	5·0	30–120 "	6–24 "	15–60 "	15–60 "	30–75 "	60–120 " †	**78·75 "**
Colchicum Seed, .	15	100	6·6	10–60 "	1½–9 "	2–8 "	5–10 "	2–5 "	2–10 " †	**8·25 "**
Conium, ...	15	100	6·6	15–60 "	2¼–9 "	5–20 "	2–5 "	2–10 "	3–10 "	**11·25 "**
Digitalis, ...	15	100	6·6	5–30 "	¾–4½ "	1–4 "	2–5 "	4–15 "	2–5 "	**7·25 "**
Gelsemium, . . .	15	100	6·6	5–20 "	¾–3 "	1–6 "	5–10 "	4–15 "	1–3 "	**8·5 "**
Hyoscyamus, . .	15	100	6·6	10–60 "	1½–9 "	4–10 "	5–10 "	5–10 "	5–10 "	**10·0 "**
Nux Vomica, . .	20	100	5·0	5–30 "	1–6 "	1–10 "	1–5 "	1–5 "	1–5 " †	**6·25 "**
Stramonium, . .	10	100	10·0	10–30 "	1–3 "	1–4 "	1–3 "	1–3 "	1–3 " †	**3·25 "**
Veratrum Viride, .	50	100	2·0	1–4 " (2-8 drops.)	½–2 "	½–2 "	2–4 "	2–5 "	2–4 "	**3·75 "**

* Not Official. † Assayed Fluid Extract.

TABLE NO. 2.

NAME OF DRUG.	Percentage of Drug in U. S. P. Tincture. (by weight.)	Percentage of Drug in U. S. P. Fluid Extract. (by volume.)	Increased Strength of Fluid Extract in Drug. (times.)	Dose of Tincture.	*Relative* Dose of Fluid Extract.	Dose of Fluid Extract of Manufact'r. A.	Dose of Fluid Extract of Manufact'r. B.	Dose of Fluid Extract of Manufact'r. C.	Dose of Fluid Extract of Manufact'r. D.	Average of Maximum Manu'f'rs. Doses.
Capsicum, ...	5	100	20·0	10–60 Min.	½–3 Min.	5–15 Min.	5–10 Min.	3–5 Min.	1–5 Min.	10·0 Min.
Cimicifuga, . . .	20	100	5·0	60–120 "	12–24 "	15–60 "	10–30 "	8–30 "	30–60 "	50·0 "
Cubeb, ...	10	100	10·0	30–120 "	3–12 "	10–20 "	15–20 "	30–120 "	10–30 "	47·5 "
Gentian (Comp.),	8	100*	12·5	60–240 "	4⅘–19⅕ "	10–40 "	30–60 "	60–120 "	30 60 "	70·0 "
Hops, ...	20	100*	5·0	60–180 "	12–36 "	15–60 "	30–60 "	30–60 "	30–60 "	60·0 "
Hydrastis, ...	20	100	5·0	30–60 "	6–12 "	10–30 "	10–30 "	15–60 "	10–30 "	37·5 "
Krameria, ...	20	100	5·0	30–120 "	6–24 "	15–30 "	30–60 "	15–60 "	30–60 "	52·5 "
Lobelia, ...	20	100	5·0	10–60 "	2–12 "	10–20 "	10–30 "	5–30 "	5–30 "	27·5 "
Matico, ...	10	100	10·0	30–60 "	3–6 "	15–60 "	30–60 "	30–60 "	30–60 "	60·0 "
Quassia, ...	10	100	10·0	30–60 "	3–6 "	5–15 "	30–60 "	30–60 "	30–60 "	48·75 "
Serpentaria, . . .	10	100	10·0	60–240 "	6–24 "	15–30 "	30–60 "	30–60 "	30–60 "	52·5 "
Sumbul, ...	10	100*	10·0	15–60 "	1½–6 "	10–30 "	15–60 "	15–60 "	15–60 "	52·5 "
Valerian, ...	20	100	5·0	30–180 "	6–36 "	30–60 "	15–30 "	30–150 "	15–30 "	67·5 "
Zinziberis, ...	20	100	5·0	30–120 "	6–24 "	5–20 "	5–40 "	5–30 "	5–40 "	32·5 "

* Not Official.

Examination of these tables shows marked differences between the *relative* maximum doses of fluid extracts, and those given by manufacturers for their products; and it should be noted that the manufacturers named fairly agree, in many cases, as to *maximum* doses.

If the contention that representative tinctures of drugs can be properly made by diluting fluid extracts be true, it logically follows that the *relative* dose of a given tincture and fluid extract should be *identical.* If the 10 per cent. tincture of drug *A* has the dose of sixty minims, the 100 per cent. fluid extract of drug *A* should have the dose of six minims, the difference between the official per cent. by weight for tinctures, and per cent. by volume for fluid extract making no material difference. The dose of cinchona tincture being 30 to 120 minims, the dose of the fluid extract (being about five times as strong) should be one-fifth or 6 to 24 minims; yet we find the dose as usually given is from 15 to 60 minims.

If dose is any criterion of drug-strength at all, it follows that the dose of tincture and fluid extract should be *relatively* the same, *if* the latter is to be diluted to make the former; otherwise there must be a certain difference between the proportion and the kinds of proximate principles in the drug-tincture, as compared with those in the extract-tincture Practically, it seems impossible, save in some few cases, to obtain fluid extracts which will have the same *relative* dose as the drug-tincture, for the *actual* dose of a fluid extract is not of necessity its *relative* dose compared with the dose of the tincture; and if this be so, the making of representative tinctures from fluid extracts is impossible. Manufacturers of fluid extracts are not to be blamed for this; it is a condition of drug-exhaustion over which they have no control. In the making of fluid extracts, manufacturers may exhaust a drug of *all* its soluble proximate principles, obtaining them in solution, but on storing the fluid extract for a time before selling, which is always done (or if it is not done, the fluid extract precipitates afterwards), the product invariably yields, through certain changes, precipitates of proximate principles more or less voluminous in character, and more or less valuable therapeutically. These are removed by decantation and filtration by the manufacturer before the product is sold.

It does not follow that fluid extracts so treated are necessarily inferior, *they may be of excellent quality for fluid extracts,* but they

are not relatively as strong as drug-tinctures. It is clearly unreasonable to claim that the same tincture can be had by extract-dilution as by drug-exhaustion when more or less of the proximate principles of the drug have been removed from the fluid extract used for dilution.

It is a mistaken belief to suppose that a definite relation exists between the tincture and the fluid extract in the amount of drug represented; that, for example, a 100 per cent. fluid extract represents five times as much drug as a corresponding twenty per cent. tincture. A due allowance must be made for the removal, by the maker, of proximate principles precipitated by the fluid extracts; admitting the possibility, of the concentrating in fluid extracts of all the soluble principles of drugs. Hence, under the best conditions, the making of tinctures by diluting fluid extracts cannot yield products equally representative with drug-tinctures, unless perfect exhaustion of drugs be had in making the fluid extracts, and proper allowances be made for the character and amount of proximate principles separated from them; and this latter, from its variability, is out of the question.

It is in evidence, that fluid extracts and tinctures have distinct *therapeutic* fields; that they vary from each other in the relative proportions, and in some cases, of the kinds of proximate principles represented, and that fluid extracts diluted in the usual way cannot, of very necessity, be the same things, *therapeutically*, as tinctures made from superior qualities of drugs.

The practice of using fluid extracts, assayed or not, for making tinctures should be condemned, as inimical to the best interests of legitimate medicine and pharmacy. Only through the use of superior drugs and the making of his own tinctures according to official methods, can the pharmacist *know* the quality of his preparations. How can he vouch for the quality of a drug after it has been made up into a preparation if somebody else has made it?

Admitting that the manufacturer's preparation has been made from the proper quality of drug; after the drug has been exhausted of *all* its soluble proximate constituents; that the official menstruum has been used; that the employment of heat has not affected last portions of percolate, and that various amounts of precipitated proximate principles have not occurred in the fluid extract and been removed, what *knowledge* has the practical pharmacist of these

facts? How can he vouch for the quality of a preparation, or rather the quality of its contained drug, unless he has made that preparation himself?

Further granting that manufacturers, as a class, use the proper quality of drugs in making fluid extracts, is it true that they always follow the directions of the official standard in the procedures and menstrua directed? Or, is it true that the official standard is adopted in part as regards percentage of drug, etc., and procedures and menstrua are used as suits the manufacturer? Manufacturers, generally, lay stress upon the fact that their fluid extracts are "strictly U. S. P.," but do they all follow the official standard in the procedures and menstrua directed for different fluid extracts? That is the question. Some are frank enough to admit that they use methods of their own devising for drug-exhaustion, and then evade the question of menstrua used, holding that their preparations represent those of the Pharmacopœia if the drug has been exhausted of all the proximate principles soluble in the particular menstruum *they* employ, despite the apparent intention of the Pharmacopœia to have a preparation of a *certain* alcoholic strength holding in solution *certain* proximate principles, some of which are soluble in that strength of menstruum *only*.

So, as regards the preparation of tinctures, the only right practice for the pharmacist lies in his buying the best quality of drugs, and making his own preparations. In this way there is safety—safety for the doctor who prescribes, the druggist who dispenses, and last, but most important of all, the patient who swallows the medicine.

ABSTRACTS FROM THE FRENCH JOURNALS.

TRANSLATED FOR THE AMERICAN JOURNAL OF PHARMACY.

The soluble ferments present in Penicillium glaucum were extracted by E. Gérard by the following process: The matured fungi were triturated with sand and macerated with the smallest possible quantity of distilled water. The aqueous solution is concentrated in a vacuum, filtered, and precipitated with absolute alcohol; the flocculent precipitate obtained is a very impure mixture of ferments which are separated by taking up the coagulated albuminoid matter with a little water, filtering and again precipitating with absolute alcohol. The product, washed with ether and dried in vacuum, is a

whitish gray powder, composed of a mixture of various diastases and some nitrogenized matter.

The author was able to prove that beside invertin and diastase, this fungus secretes also a ferment acting like emulsin. He placed in a test tube 10 cc. of a solution (1 : 100) of amygdalin and added 0·10 gm. of the ferment extracted from Penicillium, and found after 24 hours that the amygdalin had entirely decomposed into glucose, essence of bitter almonds and hydrocyanic acid.—*Jour. de pharm. et de chim.*, July, 1893, page 11.

Trehalase—a new soluble ferment.—The circumstance that, while trehalose is formed in mushrooms when these commence to produce their spores, it gradually diminishes as they approach maturity, and that glucose makes its appearance at this time, suggested to Em. Bourquelot the possible presence of a ferment converting the one into the other; he found the ferment for the first time in *Aspergillus niger*, and proposes to name it *trehalase*, in conformity with the name *maltase* designating the ferment of maltose. As this product acts not only on trehalose but also on maltose, two hypotheses present themselves—either that Aspergillus secretes only one ferment, but acting upon two sugars; or that two are secreted, each with its own proper activity. Investigating this matter further, the author found that the action upon trehalose is entirely destroyed at 63° C., while the action upon maltose still persists to between 74–75°, thus proving the probable presence of two ferments.—*Jour. de pharm. et de chim.*, May, 1893, p. 497.

Differentiation of α- and β-naphthol.—M. Aymonier uses the following reagent for distinguishing between α- and β-naphthol: Potassium bichromate, 1 gm.; distilled water, 10 cc.; pure nitric acid, 1 gm. A few drops of this reagent produce with α-naphthol an immediate black precipitate which darkens upon further addition of the reagent, while β-naphthol is not affected by the test. Salol, benzonaphthol, thymol and other phenols are likewise insensible to this reagent.—*L'union pharm.*, July, 1893, p. 334.

Liquid antiseptic salol was described by P. Reynier before the *Soc. de Biologie* as a product worthy of various application in surgery. It fuses at 40–42° C., and then remains liquid below that point for some time. Beside the combination with camphor, it combines also with iodoform and aristol, with which substances it

forms fluid and easily injectable mixtures—*Rev. de thér. méd.-chir.*, August, 1893, p. 404.

Mercuric biniodide—solution in olive oil.—For this purpose the olive oil is first purified by mixing 1,000 cc. of the oil and 300 cc. alcohol, leaving them in contact for several days and agitating occasionally. The alcohol is then decanted and the oil submitted to sterilization. For preparing the biniodide solution, the oil is heated for about ten minutes at a temperature not exceeding 110–115° C.; when the temperature has been reduced to about 65°, 40 cgm. of the mercuric salt for each 100 cc. of oil are gradually added, stirring with a glass rod. When solution has been effected, filter through sterilized cotton, into sterilized, yellow glass containers. The solution prepared in this manner is very permanent.—J. Delacour, *Jour. de pharm. et de chim.*, June, 1893, p. 603.

The action of cotton on sublimate has been demonstrated by Leo Vignon (*Laboratoire de Chim. appliq.; Jour. de pharm. et de chim.*, July, 1893 p. 13), whose investigation leads him to the following conclusions: Bleached cotton, immersed in dilute aqueous or alcoholic solution of sublimate, absorbs proportionately more mercuric oxide than hydrochloric acid; the mercury absorbed is only partially soluble in water as $HgCl_2$, a portion being retained as HgO and Hg_2Cl_2, and time diminishing the soluble quantity, and increasing that which is insoluble in water. These observations will be of service in the preparation of sublimate bandages.

Acrylic acid is prepared by C. L. Moureu from β-chloropropionic acid, for which the author gives his process, as follows: β-chloropropionic aldehyde, $CH_2Cl–CH_2–CHO$, is oxidized by nitric acid, of 1·47 density, gradually added; the reaction is very violent, and cooling is necessary; the product is heated over a water-bath, the container then surrounded with ice and cooled to 0° C. About two-thirds of the acid are recovered and placed over lime in a vacuum. For extracting the β-chloropropionic acid remaining in the drying oil, the latter is diluted with four times its volume of water, and exhausted with ether; the ethereal solution leaves upon distillation a syrupy residue, which is heated on the water-bath for several hours and solidified by cooling.

The resulting acid is heated with aqueous solution of potassium or sodium, and after cooling dilute sulphuric acid is added in a

quantity exactly calculated to saturate the alkali in excess and displace one molecule of acrylic acid. The liquid is then distilled until litmus is scarcely reddened, when about four litres of aqueous solution of pure acrylic acid will have been obtained. The analysis of the acrylates of lead and sodium gave, respectively, the following results, showing the purity of the acid:

Per cent. of Pb,	59·45 found;	59·24 calculated.
" Na,	24·32 "	24·47 "

—*Jour. de pharm. et de chim.*, July, 1893, p. 16.

Emulsion of creosote by means of casein saccharate is prepared by M. Léger, by adding 10 gm. each of saccharate of casein and water to a mixture consisting of 10 gm. each of creosote and alcohol. When, after several seconds' agitation, the emulsion is complete, sufficient water is added to make one liter. This preparation can be administered either by the mouth or rectally, and remains unchanged for a long time.— *L'union pharm.*, July, 1893, p. 297.

Zirconium is prepared by L. Troost (*Jour. de pharm. et de chim.*, July, 1893, p. 76) by mixing intimately a quantity of zircon and the carbon of burnt sugar, and submitting this to the action of electricity under a slow current of carbonic acid gas, when the reaction takes place at once, producing a carbide of the formula, ZrC_2; this is then decarbonized by the further gradual addition of zircon. The product is steel-gray and extremely hard; unalterable at ordinary temperatures, burns with a bright flame, when it is carbonized, and is attacked by hydrofluoric acid, even when this is very dilute.

Thorium is prepared by the same process from thorine, the product being less hard than zirconium, decomposing water and altering in contact with moist air. On remelting the thorium carbide with an excess of thorine, a small quantity of a metallic substance was obtained which was not altered by air.

Selenium was submitted to the action of three solvents for ten hours, at the end of which time it was found that an abundant precipitate had been yielded by potassium carbonate solution, while dilute lactic acid dissolved a notably smaller quantity, and saliva only traces. Physiological experiments proved it to be much more toxic than sulphur, while in certain skin diseases, used as a salve in the proportion of 2 gm. precipitated selenium to 30 gm. vaseline, it was

more efficacious than sulphur.—Dr. Demontporcelet and Ch. Féry; *L'union pharm.*, June, 1893, p. 249.

Estimation of uric acid.—P. Ducong uses for this purpose a modification of Arthaud and Butte's copper hyposulphite test (see AMER. JOUR. PHARM., 1890, p. 134). Since the cupric hyposulphite solution is very alterable, the author prepares the following solutions, which, separatelv, are permanent:

Solution 1.—Pure crystallized copper sulphate 4·47 gm., sulphuric acid 5 drops; diluted with distilled water to 1,000 cc.

Solution 2.—Hyposulphite of sodium, 45 gm.; potassium sodium tartrate, 45 gm.; diluted to 1,000 cc. with distilled water.

Every 10 cc. of a mixture of equal parts of these two solutions employed, indicate 1 cgm. of uric acid per litre of urine examined. The reaction takes place according to the formula:

$$S_2O_3Cu_2 + C_5H_2N_4O_3Na_2 = S_2O_3Na_2 + C_5H_2N_4O_3Cu_2$$

—*L'union pharm.*, July, 1893, p. 329.

Eczemine is a ptomaine not found in normal urine, but occurs in urine during eczema. It is poisonous, a hypodermic injection having caused in a rabbit inflammation, fever and finally death. It forms a hydrochlorate, an auro-chloride, and a platino-chlorate, and yields precipitates with various acids, mercuric chloride and Nessler's reagent. Analysis assigns to it the formula $C_7H_{15}NO$.—*Acad. d. scien.*, May, 1893; *Jour. de pharm. et de chim.*, July, 1893, p. 78.

The test for blood in urine with turpentine and tincture of guaiacum wood will not produce the blue coloration, according to Ferraro, if ammonium is present in the free state, even when blood is present in notable quantities. If ammonium carbonate in excess be added to a urine containing blood of faintly acid reaction, the above reagents produce the blue color, which, however, disappears under the influence of heat as ammonium is set free from the carbonate; while with the direct addition of free ammonium the tests do not respond at all.—*Bollet. farm.*; through *Monit. de la pharm.*, May, 1893, p. 1270.

For recognizing artificial coloring matters in wines the following process is given in *Revue vinicole*, based on the property of a saponaceous solution of destroying the natural coloring matter of wine, while foreign colorants are not attacked: 5 cc. of hydrometric solution are mixed with 5 cc. distilled water, 5 to 10 drops

of the wine to be examined added, and the tint of the liquid noted by transmitted light or against a white background. By this test natural wine gives only a slight grayish tint; fuchsine, intense rose-red; cochineal, red; hæmatoxylon, violet-red; hollyhock, bluish-green; red poppy, faint, pale brown; phytolacca, rose-violet; aniline violet, bluish-violet. The hydrometric solution employed must be of neutral reaction and must not contain a free alkali, since the latter would give the wine a green coloration. One cgm. of colorant per litre of wine can be detected by this test.—*Bull. de la Soc. de Pharm. de Bord.*, June, 1893, p. 175.

Artificial coloring matters in butter can, according to a writer in *le génie civil*, be determined by the following tests: If a certain quantity of butter be agitated with alcohol, and after standing for a few minutes the alcohol decanted and evaporated over a flame, the butter will yield nothing to alcohol. If it is colored with *annotto* the addition of sulphuric acid will cause a red brown deposit. The presence of *curcumin* will produce a deep red residue with hydrochloric acid, and intense brown with potassium and sodium, while subacetate of lead will cause a red precipitate if *saffron* be the coloring matter, and alkali a green one in presence of *carrot*, as a coloring agent.—*Bull. de la Soc. de Pharm. de Bordeaux*, June, 1893, p. 189.

Mururé is the name given by the natives to a Brazilian tree, the botanical source of which is unknown. The bark presents a brick-red color, with darker patches on the outer surface; internally it is fibrous, grayish and rather hard. Upon incision a reddish, syrupy liquid exudes, which is of acid reaction, 1·100 density, and is called *vegetable mercury*. The physiological experiments show it to be poisonous, injections of the neutralized juice having caused death in various animals. The authors have detected the presence of an alkaloid, besides other principles.—H. Cathelineau and C. Rebourgeon; *L'union pharm.*, July, 1893, p. 333.

GLEANINGS FROM THE GERMAN JOURNALS.

By Frank X. Moerk, Ph.G.

Zinc borate is obtained as a precipitate by mixing hot filtered solutions of 25 gm. zinc sulphate in 250 gm. distilled water and 20 gm. borax in 500 gm. distilled water; the precipitate is washed with cold distilled water until the washings give no further

precipitate with barium chloride solution. After drying, the compound forms an amorphous, white powder insoluble in water and alcohol, but soluble in both water of ammonia and hydrochloric acid. The frequent combination in prescriptions of zinc oxide and boric acid suggested the preparation.—W. Koll, *Pharm. Post*, 1893, 338.

The iodine absorption of fats and fixed oils, proposed by von Hübl which has proven such an important factor in the study of this class of bodies, despite the objectionable feature, first announced by its originator, of the continued deterioration of the standard solution, has received attention from a number of sources having for their object the correction of this defect. In the Am. Jour. Pharm., 1893, 382, P. Welmans proposes a mixed solvent of ether and acetic acid. Dr. W. Fahrion (Chemiker Ztg., 1893, 1100) substituted methyl alcohol for the ethyl alcohol in making the solution and examined the solution repeatedly during four weeks; the decrease in strength, after one month's standing was, for the ethyl alcohol solution, 33·6 per cent., while for the methyl alcohol solution it amounted to only 12·1 per cent.; the latter lost during the first twenty-four hours 1·1 per cent., the former 6·6 per cent. F. Gautter calls attention to the mercuric chloride and proves that apart from solvent and excess of iodine, which had previously been announced as matters of importance in getting trustworthy results, the presence of the mercuric chloride in varying amounts will give as results, variable iodine absorption figures, the greater the amount of mercuric chloride the higher the iodine absorption; probably the most important result obtained was that in the presence of the mercuric chloride the saturated fatty acids, like lauric and stearic, absorbed iodine. For these experiments a solution of iodine in carbon tetrachloride was used, the mercuric chloride was dissolved in the smallest possible quantity of absolute alcohol and diluted with carbon tetrachloride to make a solution of 5 gm. in 100 cc.; this introduced very little alcohol when added to the iodine solution. Gautter recommends therefore to omit the mercuric chloride in the iodine absorption tests, and as a simply alcoholic solution acts too slowly, he suggests an iodine solution in carbon tetrachloride; this solution is most rapidly made by stirring or agitating one gram iodine with small portions of the solvent at a time, decanting and adding another portion, etc., until all of the iodine is dissolved and the solution measures one liter. The sodium thiosulphate solution is made by dissolving 19·528 gm. in sufficient

water to make one liter solution. These solutions are titrated as in the original method by Hübl. To determine with them the iodine absorption of oils, etc., about 100 milligrams of a drying oil and 200 milligrams of a non-drying oil are weighed into a glass stoppered bottle, 50 cc. of the iodine solution added, agitated until the oil is dissolved, the iodine solution covered with a layer of water to prevent loss of iodine and allowed to stand fifty hours; the excess of iodine is then titrated by adding the thiosulphate solution until after agitation only a faint red color remains; the addition of a small quantity of starch paste is then made and the thiosulphate added until the mixture is completely decolorized. The difference in the sodium thiosulphate solution required in the blank and actual tests gives the quantity from which the iodine absorbed by the oil is calculated. The results obtained are notably lower than those obtained by Hübl's method, although they are proportionately about the same: Cotton-seed oil, 43–45; linseed oil, 76, and lard, 23–27.—Dr. F. Gautter (*Ztschr. f. anal. chem.*) *Südd. Apotheker Ztg.*, 1893, 133, 145 and 265.

Headine, a secret preparation, was found to consist of 68·73 per cent. acetanilide and 31·57 per cent. sodium bicarbonate.—Dr. A. Schneider, *Pharm. Centralhalle*, 1893, 364.

Spiegler's albumen reagent has been modified so that it is even a more delicate test for albumen detecting 1 in 350,000. Its composition: Mercuric chloride, 2·0; tartaric acid, 1·0; distilled water, 50·0 and glycerin, 5·0.—*Pharm. Centralhalle*, 1893, 424.

Pure amylene (*Pental*) is obtainable by a patented process as follows: Tertiary amyl alcohol is heated on a water-bath with an organic acid, like citric, tartaric or better than these with oxalic acid; the acid is heated to 60–90° and the alcohol allowed to run in in a steady stream; the decomposition is effected at once, the amylene distilling off and carrying with it the greater part of the water. The residual oxalic acid can be used repeatedly; the amylene after washing and fractioning has a constant boiling point of 38°, and is perfectly free from amyl alcohol, foreign hydrocarbons, etc., being especially suitable for therapeutic uses.—*Pharm. Centralhalle*, 1893, 431.

Thioform, a substitute for iodoform, is a basic bismuth dithiosalicylate; attention is called to it in the treatment of ulcers and diseases of the eye and skin.—*Pharm. Ztg.*, 1893, 426.

Mace.—In the course of an investigation of a number of samples of mace, it was found that the tests relied upon for the detection of adulteration of mace with inferior varieties depending upon the presence and behavior of coloring principles (Am. Journ. Pharm., 1891, 188) might lead to error, since it was found that with some practice the test revealed small quantities of coloring matter not only in the genuine Banda mace, but also in the nutmeg. The color tests are best obtained by extracting mace first with petroleum-ether and then with ether; the ethereal solution is evaporated, the residue taken up with alcohol and the test made with the alcoholic solution. In this connection an observation was made which probably will be of considerable service in deciding upon the question of adulterated mace. The samples were extracted successively with hot petroleum-ether, ether and alcohol; the petroleum-ether extracts in the cases of Banda mace and nutmeg represent extract free from volatile oil.

Material.	Petroleum-ether Extract. Per Cent.	Ether Extract. Per Cent.	Alcohol (96 per cent.) Extract. Per Cent.
I. Dark Bombay, whole, ...	31·60	30·40	5·90
II. Light " "	34·00	29·50	3·30
III. Mixed " coarse powder,	30·40	36·70	
I. Dark Banda, selected, whole,	19·10	3·49	3·47
II. Light " " "	24·50	2·50	2·60
III. Commercial Banda, coarse powder, ...	23·90	2·86	4·50
IV. Commercial Banda, coarse powder, ...	—	2·14	—
V. Commercial Banda, coarse powder, ...	—	3·21	—
VI. Commercial Banda, coarse powder, ...	—	1·82	—
VII. Commercial Banda, coarse powder, ...	—	3·10	
I. Nutmeg, ...	31·70	0·60	1·40

The ether extracts are of a resinous nature, soluble in alcohol, and yield the color tests; the ether and alcohol extracts from the Bombay mace are both much deeper in color than those from the Banda mace. It will be noticed that the Bombay mace is not distinguished from the Banda mace so much by the difference in fat as it is by the ether extract, after the petroleum-ether extraction; Banda mace yielding a maximum of 3·50 per cent., while Bombay mace

yields about 30·5 per cent., or ten times as much.—P. Soltsien, *Pharm. Ztg.*, 1893, 467.

The alkaloids of Lupinus albus.—The powdered seeds are boiled with two successive portions of water, the decoctions united and evaporated to an extract consistency; this is mixed with some milk of lime and then dried by the addition of dry slaked lime. The dry powder is extracted with petroleum benzin (b. p. 85–150°); the solution is agitated with dilute hydrochloric acid and from this solution the alkaloids are liberated by potassa and extracted with ether. The ethereal solution upon evaporation left a honey-like crystalline mass, which by expression and the use of ether and benzin was separated into two alkaloids, one crystallizable, the other liquid and uncrystallizable (except when kept in vacuo over sulphuric acid, it then forms very deliquescent crystals). Both alkaloids are monacid, have the formula $C_{15}H_{24}N_2O$, and form aqueous solutions becoming turbid upon heating; they differ only in physical properties and the melting points of the salts. The liquid alkaloid is probably identical with the *lupanine* of Hagen extracted from Lupinus angustifolius; it yields a dextrogyre hydrochlorate melting at 131–132° and an aurochloride melting at 198–199°. The crystallizable alkaloid melts at 99° and forms salts which are more soluble and more fusible than the corresponding salts of the liquid alkaloid; the optically inactive hydrochlorate melts at 105–106°, the aurochloride at 182–183°.—A. Soldaini, *Arch. der Pharm.*, 1893, 321–345.

The ethereal oil of male-fern.—Dr. A. Ehrenberg obtained the following yields of oil from rhizomes collected at different periods; the rhizomes were of recent collection and air dried; from these, oil was separated by distilling with steam and extracting the oil from the aqueous distillate by the use of ether: April, 0·008 per cent.; June, 0·025 per cent; September, October and November, 0·04–0·045 per cent. The ethereal oil submitted to Professor R. Kobert for experiment was pronounced by him to be a specific poison for the lower animals and to be an undoubted factor in the male-fern treatment for tape-worm. A preliminary chemical examination of the oil indicates that it consists of free fatty acids of which butyric acid predominates; of a number of esters of hexyl and octyl alcohol with the fatty acids commencing with butyric acid and including

pelargonic acid; lastly of small quantities of aromatic bodies. The statement of Kobert that the oleo-resin of Aspidium filix mas, if deprived of the ethereal oil was of inferior action (Am. Jour. Pharm., 1893, 135) is also true of the oleo-resin of A. athamanticum.—*Arch. der Pharm.*, 1893, 345, 356.

Siam benzoin, examined by the method of analysis as described under Sumatra benzoin (Am. Journ. Pharm., 1893, 223), contained the following constituents: 0·3 per cent. of an oily, aromatic, neutral liquid, which was proven to be an ester of benzoic acid; the alcohol, possibly cinnamyl or benzyl, owing to the small quantity, was not identified, but was found to give the odor of benzaldehyde when mixed with sodium hydrate and potassium permanganate; 0·15 per cent. vanillin; some free benzoic acid; the greater portion of the benzoin is composed of two esters—the benzoates of benzoresinol and of siaresinotannol. The benzoresinol, $C_{16}H_{26}O_2$ (of which about 5 per cent. was obtained), is identical with that found in the Sumatra benzoin; it crystallizes especially well from acetone, forming groups of long, white prisms. The second alcohol, siaresinotannol, present to the extent of 57 per cent., has the formula $C_{12}H_{14}O_3$, in other respects it agrees with the resinotannol from the Sumatra benzoin. Siam benzoin is perfectly soluble in ether; if this solution be agitated with a dilute solution of potassium hydrate, the entire liquid will suddenly solidify, forming a jelly-like mass, which, under the microscope, is seen to be a mixture of minute yellow needles and an amorphous mass. The crystals are potassium-benzoresinol, and their ready formation was availed of in the separation of the two alcohols.—Fritz Lüdy, *Arch. der Pharm.*, 1893, 461–480.

Alkaline solution of peptonate of iron.—15·5 gm. pure peptone dissolved in 80 gm. water are mixed with 185 gm. solution of oxychloride of iron, Ph.G. III, and the mixture carefully neutralized with solution of soda; the precipitate is collected, washed until free from chlorine, warmed with 200 gm. simple syrup, solution of soda carefully added until the precipitate is dissolved and diluted with water to 1,000 gm.—(*Berl. Apoth. Ver.*) *Apotheker Ztg.*, 1893, 370.

It has been brought to our notice that the exhibits of the manufacturing pharmacists at the Columbian Exposition are located in the gallery of the liberal arts building, and as from its position it is liable to be overlooked, we beg leave to here call attention to its position.

DRAGON'S BLOOD.[1]

By Professor Flückiger.

In an article in the *Pharmaceutical Journal* of July 15, p. 47, Monardes is quoted as the first author who mentioned American dragon's blood. In his "Primera y segunda y tercera partes de la Historia medicinal de las cosas que se traen de nuestras Indias Occidentales que sirven en Medicine," Sevilla, 1574, page 78, the figure "El dragon" shows three pods of a tree from which the drug was collected in the time of Monardes, in the country of Carthagena. One of the pods is open and exhibits the outline of an animal of the fabulous kind of a dragon, just as described in the said paper in the words of Gerard's "Herbal."

The question to be solved is, says the author of the paper inserted in the *Pharmaceutical Journal* (from *Gardeners' Chronicle*), what was the fruit mentioned by Monardes, which contained so striking a verisimilitude to a dragon?

The figures of Monardes are so extremely crude that they cannot afford any idea of the plant to which they belong. Still, they may be allowed to represent the pods of some species of the leguminous order.

Dragon's blood was certainly never an important article of commerce in Europe, and that from Carthagena probably made its appearance in the market but very irregularly, and has completely disappeared long ago. It was, however, to be met with at that time; thus we find it plainly described by one of the most competent pharmacologists of the middle of our century. Theodore W. C. Martius (see Hanbury's "Science Papers," p. 7 and 25), Professor of Materia Medica in the Bavarian University of Erlangen (+1863), enumerates three varieties of dragon's blood in his "Grundriss der Pharmakognosie," Erlangen, 1842, p. 366 to 369, viz: that from Calamus, that from Dracæna (see "Pharmacographia," 2d edition, p. 672 to 676), and, thirdly, that from Carthagena, the source of which according to Martius, is *Pterocarpus Draco*, L. This tree having been named by Linné, the knowledge of its product must have induced Linné to bestow on it the specific name of Draco. *Pterocarpus Draco*, indeed, is pointed out as the mother plant of the drug under notice as early as A. D. 1749, in the first edition of

[1] From Pharm. Jour. Trans., Aug. 5, 1893, p, 108.

"Caroli Linnæi Materia Medica," Liber I, De Plantis, p. 184, No. 522. It is true that Java and India orientalis were erroneously stated by Linné to be the native countries of the tree.

The description of the resin, as given by Martius, is so accurate that we may feel quite sure that he had it before him. Whether he had actually the opportunity of ascertaining its botanical origin must remain unsettled. But Lindley already, in his "Flora Medica" 1838, p. 257, mentioned *Pterocarpns Draco* as yielding the red juice from the wounded stems; he also quoted a statement of Jacquin's to the effect that large quantities of that dragon's blood had once been exported from Carthagena to Spain. When Jacquin paid a visit to Carthagena, between 1754 and 1759, he found the commerce in dragon's blood had almost ceased. In his "Enumeratio systematica plantarum quas in insulis Caribæis vicinaque Americæ continente novas detexit," etc., Lugduni Bat., 1760, t. 183, N. I. Von Jacquin figured the tree under the name of *Pterocarpus officinalis*, whereas in Hayne's "Darstellung und Beschreibung der in der Arzneikunde gebräuchlichen Gewächse," t. IX, pl. 9, the name of *Pterocarpus Draco*, Hayne, was applied to the tree which is now known as *Pterocarpus suberosus*, DC.; it is a native of Guiana.

Guibourt was also acquainted with the dragon's blood from the West Indian Islands, which he ("Histoire naturelle des Drogues simples," II, 1869, 139, and III, 346) attributed to Linné's *Pterocarpus Draco*; he says the resin was very rarely to be met with.

It would appear, therefore, that we may unhesitatingly regard that tree as the source of the dragon's blood discovered near Carthagena by the Spanish invaders. Its corky indehiscent pod of nearly orbicular outline tolerably answers to the figures of Monardes, and the solitary, kidney-shaped seed, if duly shrivelled, may remind, in the eyes of a fantastic observer, of what he supposes to be a dragon.

In India, *Pterocarpus Marsupium*, Roxb., affords the exudation called kino, which is but little used now. It would be desirable to investigate the chemical composition of the dragon's blood of the *Pterocarpus Draco*, and to examine whether it does or does not agree with the kino of the nearly allied species, *P. Marsupium*, of Malabar. On applying to Jamaica, the material for such an investigation would probably be obtainable. It would be desirable to know whether two trees so closely allied, like the two species of *Pterocar-*

pus just mentioned, could yield products so widely different as are kino on the one side and true dragon's blood on the other. In the careful monograph of dragon's blood by Lojander, Beiträge zur Kenntniss der Drachenblutes" Strassburg, 1887, the author only mentioned briefly the drug of *Pterocarpus Draco*, which he had not at his command.

We may anticipate that it rather belongs to the numerous class of kinos, the exudations of several species of eucalyptus, as well as of *Pterocarpus Marsupium* and other trees. Whether they are chemically identical or not, remains to be studied.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Reactions.—A Selection of Organic Chemical Preparations, important to Pharmacy in regard to their Behavior to commonly used Reagents. By F. A. Flückiger, Ph.D., M.D. Translated, revised and enlarged by J. B. Nagelvoort. George S. Davis, Detroit, Mich. 8vo. Pp. 154. Price, cloth, $2.00.

This excellent work describes reactions of a large number of organic preparations, natural as well as artificial, and can well be recommended to all pharmacists and pharmaceutical chemists. In the work before us we find not only the older well-known reactions, but quite a number of new ones.

The book furthermore contains, as a frontispiece, a portrait of Prof. Flückiger, and the fac-simile of a letter to the translator.

Pharmacographia Indica.—A History of the Principal Drugs of Vegetable Origin met with in India. By Wm. Dymock, Brigade Surgeon, retired, etc. C. J. H. Warden, Surgeon Major Bengal army, etc., and David Hooper, Quinologist to the Government of Madras, Ootacamund. London: Kegan, Paul, French, Trubner & Co., Ltd. 1893. Part vi, p. 313–642.

Since the publication of part 5 of this valuable work, one of the authors, Dr. Wm. Dymock, has died, and this, part vi, is fittingly opened by a eulogy of this scientist. This part is the second half of the third volume of the work, and comprises the remainder of the monochlamydeous, and the apetalous orders of the dicotyledons, the gymnosperms, the monocotyledons, filices, lichenes, fungi and algæ. Of the plants used in North America as well as in India mention might be made of *Cannabis Sativa*, leaves, tops and resin, collected all from the female plant, "which the natives consider to be the male plant, because it bears the seed." *Ficus Carica*, fig, is now cultivated in India by Mohammedans and Hindus; other species of Ficus are used medicinally. *Antiaris toxicaria*, upas tree, has the poisonous qualities only in the male plant. Galls of *Quercus infectoria; Juniper berries; Taxus baccata; Curcuma zedoaria; Indian arrowroot* obtained from Curcuma angustifolia, C. leucorrhiza, C. montana, C. longa, C. aromatica, C. rubescens, and Hitchenia caulina; *Curcuma longa; Zingiber officinale; Elettaria Cardamomum; Alpinia officinarum* is a stomachic tonic, and is used by native Indian practitioners to reduce the quantity of urine in diabetes; *Crocus sativus; Aloe* is used by Moham-

medans as aperient, deobstruent, depurative, anthelmintic and tonic, as a collyrium for strengthening the sight and removing styes on the eye-lids, furthermore for the dispersion of swellings and the promotion of granulations; *Areca catechu*, betel nut, the unripe nuts are described by Hindu writers as laxative and carminative, the fresh nuts as intoxicating and productive of giddiness and when dried are said to sweeten the breath, strengthen the gums, remove bad tastes from the mouth, and produce a stimulant and exhilarating effect on the system; early Arabian writers describe it as good for hot and gross humors, prepared as a liniment, for inflammation of the eyes, as a collyrium, and of great efficacy for drying up the seminal fluid and as a digestive; *Calamus Draco*, the resin from this plant did not constitute the original dragon's blood, this being exported, according to early writers on eastern commerce, from Arabia and Socotra. *Acorus Calamus* is described by Mohammedan writers as deobstruent and depurative, useful for the expulsion of phlegmatic humors, which they suppose to be the cause of paralysis, dropsy, and many diseases, they also prescribe it internally in calculous affections. It has a reputation as a diuretic, emmenagogue and aphrodisiac, and is used as a poultice to paralyzed limbs and rheumatic swellings; a pessary of calamus, saffron and mare's milk is used to promote delivery. In Ceylon the rhizome is also used as an anthelmintic.

What we would further say about this interesting work would be a repetition of the reviews of former parts of this same work and we therefore simply refer to them.

Charaka-Samhita, translated into English. Published by Avinash Chandra Kaviratna, practitioner of the Hindu System of Medicine, etc., Calcutta.

We noticed the first four fascicles of this treatise on pages 286 of our last volume and 107 of the present one, to which we would like to refer. We have now before us fascicles 5 and 6 treating in five lessons of wind (gases) of oils and their uses and administration, of Sweda (often used to signify the application of heat or fomentations even when the end sought is not diaphoresis; it includes also warm water baths, vapor baths and hot cataplasms of medicinal plants), of articles which should be at hand where untoward effects of emetics and purgatives show themselves; of the skillful physician, and of some diseases of the head.

Contribution à l'étude histologique des Zingiberacées.—Thèse pour l'obtention du Diplôme de Pharmacien de 1re Classe présentée et soutenue par Gilbert Joseph Barthelot. Lons-le-Saunier, Lucien Declume, 1893.

Contribution to the histological study of the Zingiberaceæ, Thesis to obtain the diploma of pharmacist of the first class, presented and sustained by Gilbert Joseph Barthelot. Lons-le-Saunier, Lucien Declume, 1893.

The author from his work draws the following conclusions: There exists a great analogy in structure between the plants of this natural order. The sclerotic arc encircling the vascular bundles is constant in all organs except in the rhizome where it is occasionally wanting. The rhizomes with few exceptions contain large quantities of starch. The cells secreting essential oil vary considerably in number, are always distributed singly in the parenchyme tissue, the cell walls not containing suberine as has been stated by several authors. In all organs tannin bearing cells are found varying in number and shape. The

thesis is accompanied by four excellently executed photogravures of longitudinal and transverse sections of Zingiber officinalis, Costus villosus, Curcuma longa and C. zedoaria, Hedychium gardnerianum, Alpinia galanga and Curcuma leucorrhiza.

Ueber Hyoscin und Oscin. Ueber Cinchonin. Notiz über Tagetesblüthen. Vorläufige Mittheilung über Chinin, Cinchonidin und Conchinin. Von O. Hesse. Besonderer Abdruck aus Liebig's Annalen der Chemie. Band 276.

On Hyoscine and Oscine. On Cinchonine. Note on Tagetes florets. Preliminary Notes on Quinine, Cinchonidine and Conchinine (Quinidine). By O. Hesse. Reprint from Liebig's Annalen der Chemie. Vol. 276.

Will take the liberty of offering more extended extracts from the above in our next number.

Pharmacopœa Danica, 1893. Kjöbenhavn. H. Hagerups, Forlag, 1893.

Pharmacopœia Danica, 1893. Copenhagen. H. Hagerups, Publisher, 1893.

OBITUARY.

Dr. George Randolph Parry, Ph.G., died at his residence, New Hope, Bucks County, Pa., June 12, 1893, aged 53 years. He was born in Philadelphia, Sept. 3, 1839; learned the drug business with Charles Ellis, Son & Co., and graduated from the Philadelphia College of Pharmacy in 1862; studied medicine and graduated from the University of Pennsylvania in 1867. He began the practice of medicine at Union Springs, New York, and in 1880 removed to New Hope, Pa., where he built up a large practice. He was a member of the Bucks County Medical Association and the Historical Association of Pennsylvania. He leaves a wife and two daughters.

John Thomas Hoskinson, Jr., Ph.G., died at his late residence, northwest corner of Front and Norris Streets, July 29, 1893, aged 43 years. He was born at Chambersburg, Pa., learned the drug and apothecary business with the late Daniel S. Jones, Ph.G., and graduated from the Philadelphia College of Pharmacy in 1871. He was in active business at Front and Norris Streets for several years. He was a member of the Executive Board of the Alumni Association, of the American Pharmaceutical Association and of the Pennsylvania State Pharmaceutical Association, in all of which he took an active interest, attending their various meetings.

Edward Hopper, Ph.G., Class of 1833, died at his late residence, No. 1206 Spruce Street, August 7, 1893, aged 82 years. He learned the drug business with John Hart, and graduated from the Philadelphia College of Pharmacy. He started in business for himself soon after, but soon relinquished the drug business and studied law, entering the office of John Sergent, and was admitted to the bar October 31, 1839, enjoyed a large practice principally in the Orphans Court and had an extended knowledge of real estate. He was a manager of Will's Hospital and President of the Orthopædic Hospital. He was a member of the Society of Friends, and attended the meeting at 9th and Spruce Streets, and frequently preached with confidence and earnestness. For the last 20 years of his life he was a victim of facial neuralgia, and the last 8 months was confined to his house; at the time of his death he was one of the solicitors of the college.

DIED SEPTEMBER 10, 1893.

Prof. John Michael Maisch, Phar. D., Ph. M., etc.

EDITOR OF THIS JOURNAL.

A Memoir will appear in a subsequent number.